A geographical profile of the South African population as a basis for epidemiological cancer research

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Summary

Because people do not necessarily become ill proportionally, particular subgroups of the population are more susceptible to certain types of disease than others. It is also essential to take spatial distribution and accessibility of the population into account when considering the optimal location of medical facilities. A geographical profile of the heterogeneous population of South Africa with regard to demographic and socio-economic composition and urbanisation patterns is therefore presented. Analysis of the composition of the population by tabulating and mapping population census results reveals a complexity which arises from the diversity between the developed white profile and the developing black and coloured communities with their escalating numbers, relative youth and socio-economic backlog. Examination of the maps shows up an unbalanced spatial urbanisation profile with overconcentration in the five metropolitan core areas. Although such a population framework usually fits best to cancer epidemiology, most other diseases could benefit from such an approach.

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'A fundamental tenet of epidemiology is that diseases are unequally distributed within the population. This inequality is in turn normally translated into non-uniform patterns of spatial distribution. Thus, adequate planning requires a knowledge of the *spatial distribution of population* at risk for disease'[1] (my italics).

The truth of this statement is substantiated by the following empirical observations regarding cancer: *'Coloured males* have the highest risk of getting cancer in South Africa. . . . *Urban black females* have the lowest rates. . . . There has been a small but significant rise in the mortality rate for breast cancer in *white women*, mainly contributed by those over 55 years of *age* . . . Breast cancer has a direct relationship with *socio-economic status.*'[2] 'Numerous empirical studies from Western nations show that *urban areas* have higher cancer mortality and incidence rates than do *rural areas*'[3] (my italics).

Therefore, it is *people* who become ill, but they do not necessarily do so by chance or proportionally. Particular subgroups of the population are more susceptible to certain types of diseases than other groups. Further, it is essential to take spatial distribution and accessibility of population groups into account in order to arrive at the best possible location of facilities for the treatment of patients.[4]

The purpose of this article is therefore to present a very general picture of the geographical profile of the heterogeneous population of South Africa with regard to demographic and socio-economic *composition* and *urbanisation* patterns. Scientifically based information on the composition and concentration areas of the population could provide an indication of risky conditions and associated needs that require early attention.

Composition of the population

It is misleading to think of the population purely in terms of numbers, because every person has particular personal attributes. The composition of the South African population can be viewed from a number of different angles. This article focuses selectively on a few *demographic features* (i.e. ethnicity, sex and age) and *socio-economic features* (i.e. educational level, income and occupation) that, according to medical publications, reveal a particularly strong relationship with cancer. The former group of demographic variables are beyond the control of man, being biologically inherited, while the latter economic indicators reflect the acquired social well-being of a population. In rounding off the composition profile, it should be kept in mind that a population constantly undergoes *change and growth* in the course of time.

Demographic profile

Demographic characteristics are the fundamental basis of any population structure.[5,6] For the sake of an overall perspective the South African demographic magnitudes are summarised in Table I and Fig. 1. If the inhabitants of Transkei, Bophuthatswana, Venda and Ciskei are counted with those of the RSA, the 1985 population of historical South Africa totalled about 30 million, of whom 23,4 million lived in the RSA.*

Ethnically, the population of the RSA comprised 19,5% whites, 12% coloureds, 3,5% Asians and 65% blacks. As far as the present white population of approximately 4,6 million is concerned, there are two main subgroups, Afrikaans-speaking (54%) and English-speaking (37%). In terms of descent, the 2,8 million coloureds are represented by the Cape Coloureds, the Malays and the Griquas. The large majority of the nearly 800 000 Asians are the descendants of Indian immigrants. The approximately 15 million blacks are divided into four main cultural groups, the Nguni (among whom are the Zulus, who comprise 24% of the population of the RSA, and the Xhosa, who comprise 11%), the Sotho-Tswana, the Tsonga and the Venda.

Analysis of *sex composition* in South Africa shows that there is more or less an equal distribution of men and women (Fig. 1 and Table I). The system of migrant labour has created a preponderance of men in the so-called white areas, while more women are found in the Black National States. From the mid-1970s, however, black women too began to seek work away from their homes, particularly in the urban areas.

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* These population totals apply to five southern African countries. The RSA data were extracted directly from magnetic tapes supplied by Central Statistical Services, while those of the four independent national states were made available by government departments of the individual countries. As with almost every population census undercounting must be borne in mind — unfortunately the extent of underenumeration is unknown. Notwithstanding this handicap, these official censuses still represent the only and most accurate accounts of population magnitudes in the region.

TABLE I. DEMOGRAPHIC AND SOCIO-ECONOMIC PROFILE OF THE POPULATION OF THE RSA, 1980

Demographic features	Total	Black	Coloured	Asian	White
Ethnic group (% of total)	100	64,9	12,1	3,5	19,5
Sex (% males)	50,9	51,4	49,4	49,7	50,0
Average age (yrs)	24,3	22,8	23,2	23,8	30,5
Aged (% >65 yrs)	3,5	2,6	2,8	2,0	7,2
Fertility (birth/1 000 persons)	32,8	39,1	27,9	24,1	16,5
Mortality (death/1 000 persons)	10,1	11,0	9,2	5,9	8,3
Life expectancy (yrs)					
Men	58	55	56	62	67
Women	63	60	61	68	74
Average family size (No. of members)	6,5	7,5	5,0	4,5	4,0
Socio-economic features					
Educational level					
≥ Std 10 (% > 20 yrs)	10,5	1,5	4,1	14	44
Literacy (% > 15 yrs)	76	67	84	92	99
Economically active (% of total population)	34,8	32,9	35,5	31,1	42,1
Occupation (% of economically active population)					
Professional/technical/administrative/managerial	9,6	3,7	6,4	11,1	26,5
Clerical/sales	16,1	7,5	12,6	37,1	37,3
Service	18,1	22,5	17,8	6,8	8,3
Production/transport	38,9	43,6	45,2	42,7	23,2
Fishermen/farm/forestry	17,3	22,7	18,0	2,4	4,7
Women in labour force (% of total labour force)	23	31	38	26	33
Personal income (per capita annually)	R3 130	R1 189	R1 843	R3 266	R8 035
Population change					
Growth rate per annum (%), 1980-1985	2,6	3,0	2,8	1,9	1,6

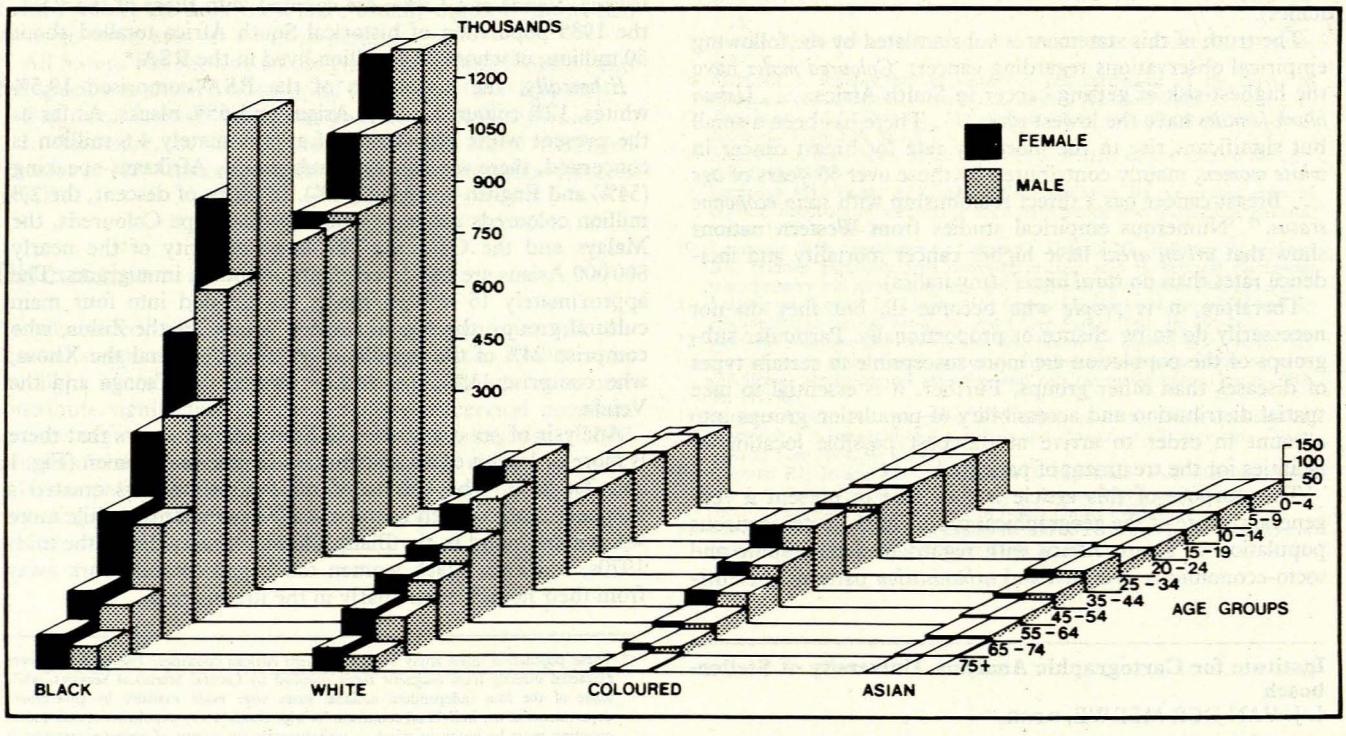

Fig. 1. Population composition of South Africa, 1980.

The *age composition* of a population has implications for the economic and social activities of a community as well as future population growth. An outstanding feature of the age structure of the South African population is the degree of ageing in the white population resulting from a decrease in the birth rate and increased life expectancy (Table I). It is interesting to note that women are 5 years older on average than men, 63 years as opposed to 58 years. Effective accommodation of the increasing number of old people means high demands on social and medical organisations involved with the needs and care of the aged. In contrast with the white pattern, the other three population groups have a much younger age structure. The average family size among coloureds and blacks is 5,0 and 7,5 respectively, as opposed to 4,0 for the whites. These groups are also characterised by a higher young dependency ratio. A very high percentage of children can limit economic development, particularly in a population already caught up in a cycle of poverty, illiteracy, unemployment and a low standard of living.

Socio-economic profile

The socio-economic characteristics of the South African population are discussed according to educational levels, occupation and income (Table I).

Educational level reflects specific differences in performance between the respective population groups. The white population and to an increasing extent the Asians have a high literacy rate and a relatively high level of education, in contrast with the coloureds and blacks, who generally have lower educational levels and literacy rates. As far as further education after Standard 10 is concerned, approximately 44% of whites have had training of one form or another, as opposed to 14% of Asians, 4% of coloureds and 1,5% of blacks. However, educational statistics for the 1980s show an increase in the number of black pupils and students at school and university.

Occupational composition indicates the nature and extent of economic activities and their contribution to the labour force of the country. A few observations are striking: only approximately a quarter of the total labour force is made up of white-collar high-level manpower (professional, managerial, clerical and sales). Whites dominate these occupational groups, while blacks and coloureds predominate in the blue-collar occupations. Substantial proportions of the economically active black and coloured populations are still involved in agriculture; however, a greater diversification among the black and coloured labour force is taking place. The number of economically active women in all population groups is increasing. The problem of increasing unemployment is greatest among the black people and in unskilled occupations.

Income varies considerably between the respective population groups. The average *per capita* income for whites in 1980 was 6,7 times higher than that for blacks, while it was 4,4 times higher than that for coloureds.

Population growth

Population structure is never static but changes constantly in the course of time. The total South African population has increased from less than 5 million in 1904 to 29,3 million in 1985 when self-governing national states and TBVC countries are included (Fig. 2).[7] The total population has shown sustained growth since the beginning of the century, with a marked increase since 1951. The various population groups have, however, increased at different rates. Whereas the white population increased by a mere 1,6% between 1980 and 1985, the coloured population increased at 2,8% per annum, while the growth rate for blacks was 3,0% per annum. The graphic

TABLE II. URBANISATION MAGNITUDES IN SOUTHERN AFRICA, 1985

	Total population	Urban population	Contribution to total SATBVC urban population (%)	Level of urbanisation (%)	Growth rate of total population (%) (1980-1985)
SATBVC per country					
Transkei	2 933 206	148 512	1,1	5,1	2,3
Bophuthatswana	1 743 435	254 143	1,8	14,6	5,6
Venda	459 819	13 492	0,1	2,9	5,9
Ciskei	766 636	404 500	2,9	52,8	2,4
RSA	23 385 645	13 068 343	94,1	55,9	2,6
Total	29 288 741	13 888 990	100	47,4	2,8
RSA per population group					
White	4 568 739	4 091 626	29,5	89,6	1,6
Coloured/Asian	3 654 066	2 971 799	21,4	81,3	2,6
Blacks	15 162 840	6 004 918	43,2	39,6	2,9
RSA per ethnic area					
White areas	16 495 237	11 958 661	86,1	72,5	1,7
Self-governing territories	6 890 408	1 109 682	8,0	16,1	4,9
SATBVC per development region					
A (Western Cape)	2 912 954	2 387 094	17,2	81,9	3,1
B (Northern Cape)	928 476	405 711	2,9	43,7	2,1
C (OFS)	1 910 999	859 827	6,2	45,0	1,9
D (Eastern Cape)	4 077 778	1 688 311	12,2	41,4	2,8
E (Natal)	7 055 348	2 359 841	17,0	33,5	2,1
F (Eastern Transvaal)	1 586 479	481 273	3,5	30,3	2,3
G (Northern Transvaal)	3 206 003	276 109	2,0	8,6	3,9
H (PWV)	6 168 868	5 008 013	36,1	81,2	3,1
J (Western Transvaal)	1 441 836	422 811	3,0	29,3	3,3

representation emphasises the increasing numbers of the black population. Natural growth in a population is essentially influenced through the interplay between fertility and mortality.

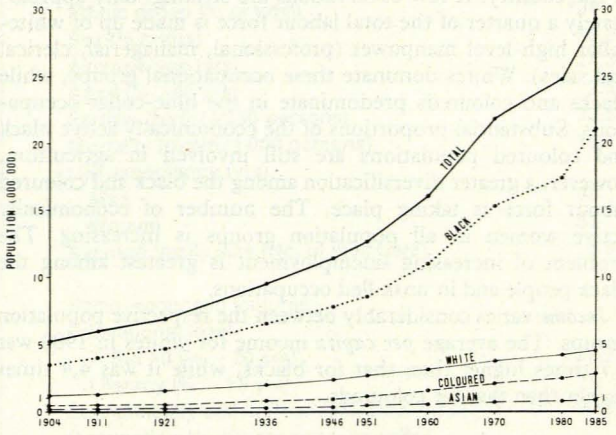

Fig. 2. Population growth of South Africa, 1904 - 1985.

Although there is a tendency for birth and death rates to decline for all the population groups, blacks show the highest fertility and, subsequently, the largest natural increase (Table I). As a result of several uncertain factors future projections vary greatly, and it is estimated that blacks will number between 46 and 66 million in the year 2020. On the same basis, coloureds are likely to number nearly 3,6 million, Asians 1,1 million, and whites approximately 5,5 million.[8]

In sum, the composition of the South African population reveals a complexity which arises from the diversity between the developed Western white profile and the developing Third-World black and coloured communities with their relative youth, escalating numbers and socio-economic backlog.

Urbanisation patterns

Urbanisation is a dynamic process whereby communities change from a dispersed rural to a concentrated urban location and lifestyle. Historically the process is interwoven with a set of economic, social and political factors, and in the southern African subcontinent, the outcome is a very complex but challenging scene.

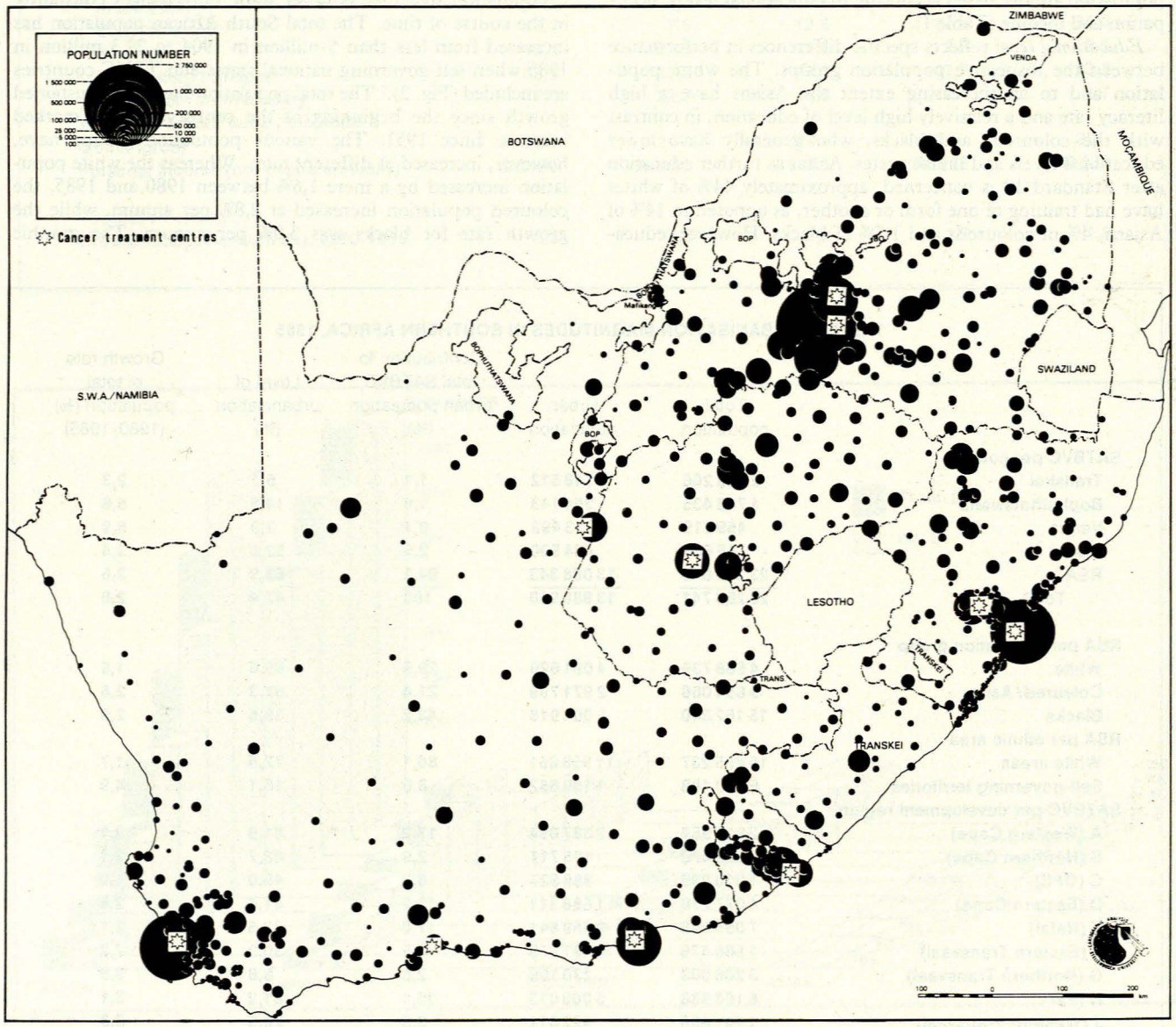

Fig. 3. Distribution and size of urban centres, 1985.

Analysis of Table II reveals that in 1985 more than 13 million people in the RSA (i.e. 56% of the total population) lived in urban areas.* In contrast with almost 90% of whites and 81% of coloureds and Asians, only 40% of the black population was urbanised in 1985. Nevertheless, the 6 million urban blacks in the RSA comprise 43% of southern Africa's total urban population. Table II further demonstrates that at present urbanisation is occurring spatially in a very concentrated manner, mainly in the white areas, relatively little urbanisation occurring in the black self-governing territories and the TBVC countries. Furthermore, the PWV primate core towers above the other regions, comprising more than one-third of southern Africa's urban population. With its 3,5 million inhabitants the Witwatersrand metropole alone is 2,2 times larger than the second-largest centre, namely Cape Town.

The spatial distribution of the more than 700 recognised urban settlements in the RSA and the TBVC countries (Fig. 3) evinces a relatively dense concentration along the coast, as well as in the northern and eastern parts. Broadly, this picture mirrors the historical settlement pattern and the richer resource base of certain areas. In these areas urban settlements are not only closer together but generally larger in size. Although uneven urbanisation is a universal phenomenon, the southern African urban system exhibits particularly abnormal signs of imbalance, i.e. too many small towns housing too few people as against too few large metropoles with relatively too many people in them. Little wonder that so many small country towns whose reasons for existence have become obsolete have decayed.

The metropolitan areas have an undoubtedly dominant position in the urban system, the PWV complex being the indisputable leader, followed on the second tier by the Cape Peninsula and Durban-Pinetown. On the third metropolitan tier are the Port Elizabeth-Uitenhage and the East London-Mdantsane complexes. Note must be taken that at multilateral level the latter metropolitan area features far more strongly than is normally conceded. Here, as elsewhere in southern Africa, artificial homeland boundaries lead to gross misconceptions about the reality of urban settlements functioning as a total integrated system. In sum, the southern African urban

* The definition of urban is based on the census criterion that some form of local authority must be present in a non-rural concentration of people.

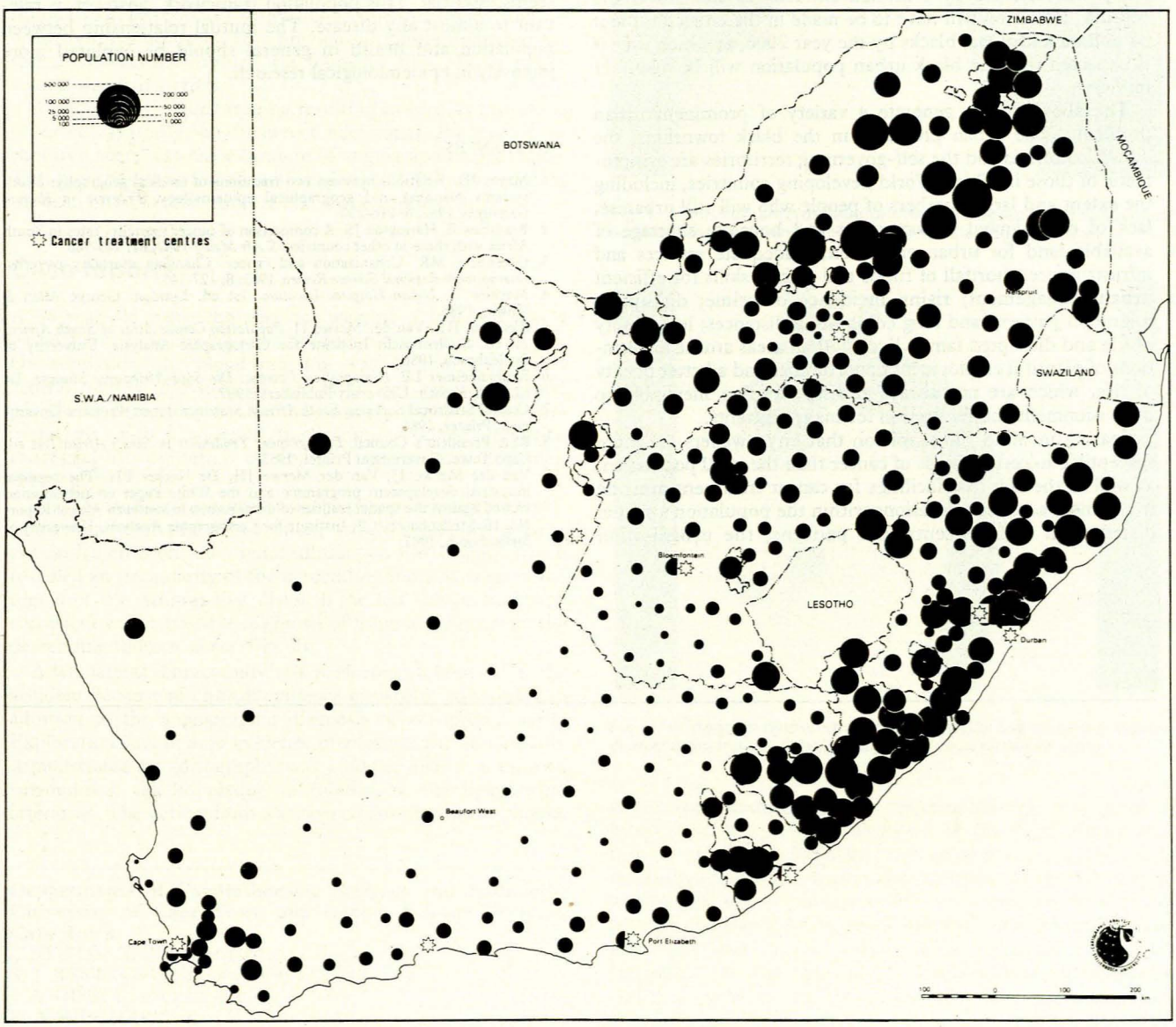

Fig. 4. Distribution and size of rural population, 1985.

scene is notably dominated by the five abovementioned metropoles (Fig. 3). During the more than 300 years of Western occupation South Africa has indeed experienced a remarkable urbanisation process. It must be emphasised, however, that not all of the urban centres have shared equally in this process, with the result that a strong unbalanced urbanisation pattern has evolved both temporally and spatially.

It is noteworthy that the main areas of rural population concentration (Fig. 4) are also in the northern and eastern parts of the subcontinent, where there are potential reservoirs for future urbanisation. It follows that Figs 3 and 4 must be interpreted complementarily in order to deduce where the future impact of urbanisation can be expected to be most intense.

The indication is that the black population will account for a superior share of future population growth and urbanisation impact. White urbanisation has already reached a saturation phase, while the trend for the coloured and Asian populations has also begun to level off. In contrast, the black population is reflecting typical characteristics of developing Third-World urbanisation — a relatively low urbanisation level and an imminent high rate of urbanisation. According to urbanisation experts it is reasonable to expect that the black urban population will increase by 1 million annually to the end of the century. Provision will have to be made in the cities for about 14 million additional blacks by the year 2000, at which time it is expected that the black urban population will be about 21 million.[9]

The above trends generate a variety of prominent urban problems. The urban problems in the black townships, the TBVC countries and the self-governing territories are symptomatic of those in Third-World developing countries, including the extent and large numbers of people who will still urbanise; lack of employment opportunities and housing; shortage of available land for urban expansion; inadequate services and infrastructure; shortfall of funds and lack of skills for efficient urban management; rising incidence of crime; disruptive migration patterns and long commuting distances; low quality of life and disrupted family lives. Urban areas arouse expectations of plentiful employment opportunities and a better quality of life, which are not always realised, leading inevitably to disillusionment and frustration for many migrants.

Bearing in mind the suspicion that city dwellers are more susceptible to certain kinds of cancer than the rural population, as well as the fact that facilities for cancer treatment must be in the most accessible locations within the population's spatial distribution and concentration patterns, the urbanisation process of the South African population is an essential factor which must be taken into account by medical planners. In general the existing main treatment centres are located in correspondence with the urban concentrations, except for the PWV complex and the northern Transvaal, which appear to be undersupplied (Fig. 3). People of lower socio-economic status in the underdeveloped rural areas of the eastern and northern parts of the country probably experience greater difficulty in access to treatment facilities (Fig. 4).

Conclusion

The above geographical profile of the South African population reveals that its composition and urbanisation pattern are complex. Nevertheless, certain tendencies and features have been highlighted, which must be taken into account by medical decision-makers when they provide facilities for cancer treatment. Furthermore, such a population breakdown might indicate potential population subgroups at risk for this disease. In the search for a solution to the problem of cancer a scientific knowledge of the anatomy of the South African population seems essential. This population framework, however, is relevant to almost any disease. The mutual relationship between population and health in general should be explored more intensely in epidemiological research.

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